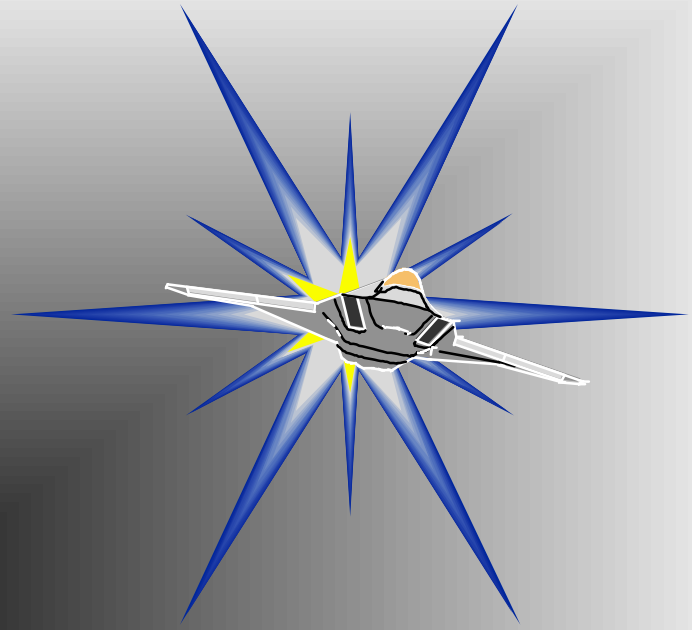
Open Systems Architecture - A Boeing Enterprise Perspective



Don C. Winter
Open Systems Architecture
Phantom Works

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OPEN SYSTEMS

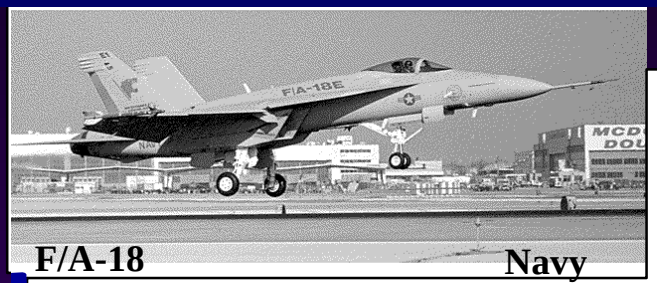
AWACS — Air Force

ABL — Air Force

Wedgetail — Foreign

Nimrod — UK

Vigilare — Australia



F/A-18 — Navy

F-15, C-17 — Air Force

AV-8B, V-22 — Marines

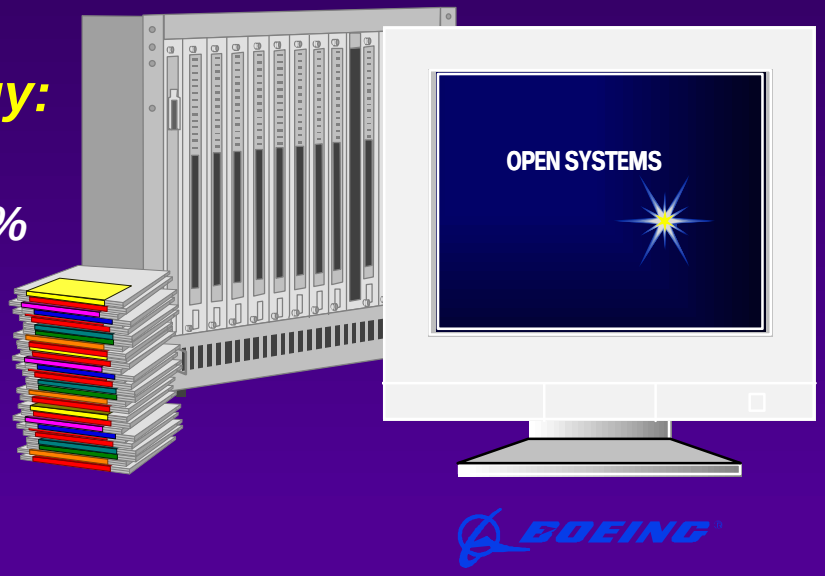
JSF — Future

A "One Company" Affordability Strategy:

- ***Reduce Flyaway Cost by 50%***
- ***Reduce Development & O&S Costs by 60%***

Leveraging:

- ***Commercial Technology Insertion***
- ***Enterprise Product Application***
- ***Process Redesign & Acquisition Reform***



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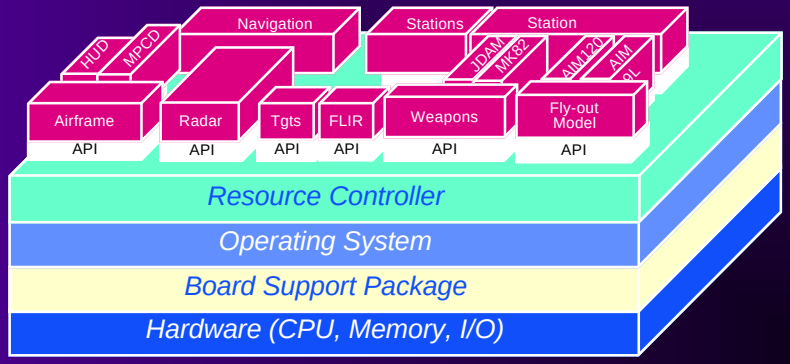
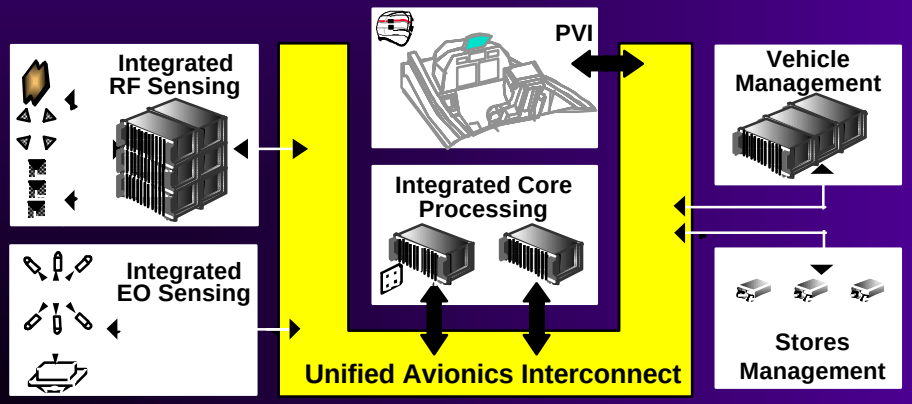
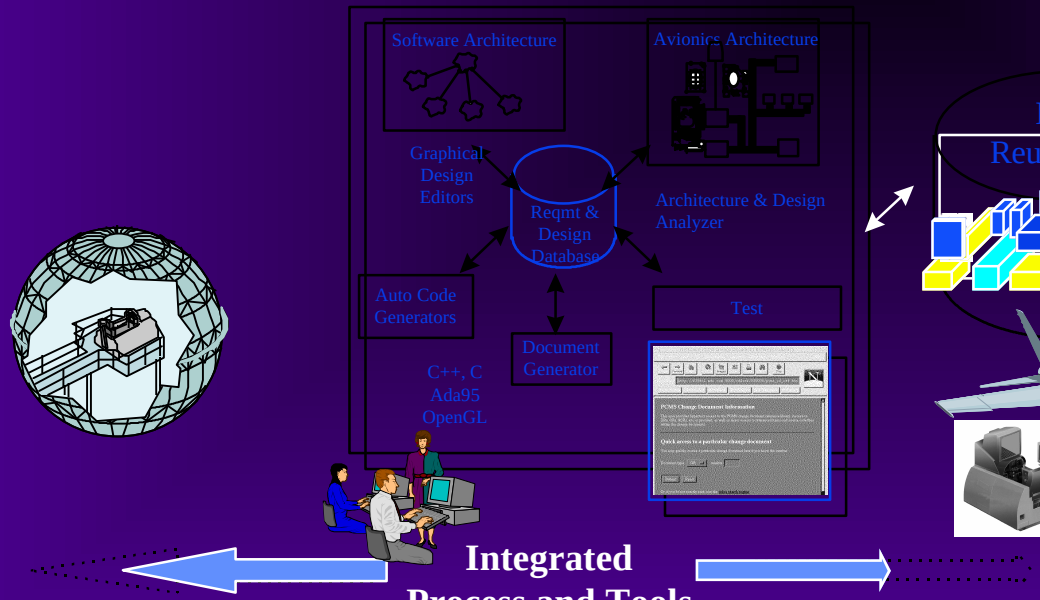
Open Systems Thrust Areas

Common Software Architecture



An Avionics Architecture Strategy





- Enterprise Roadmaps
- Leverage
- Affordability Redesign
- COTS Exploitation
- Strategic Application
- **Product <u>Transition</u>**

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VISION - Affordability Leverage

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The Aging Aircraft Avionics Issue

Extended Service Life Coupled with Declining Military Budgets and a Dwindling Supplier Base, Challenges the Effectiveness of Today's Front Line Weapon Systems

- **Parts Obsolescence - 1970/80 Hardware**
- **Unique Avionics Architectures**
  - Piecemeal Upgrades
  - Development Cost & Schedule
- **Software Upgrades**
  - Cost to Maintain
  - Cost to Upgrade
  - Verification/ Validation

The Challenge: Provide Affordable & Rapid Options to Retaining The Effectiveness of Legacy Systems

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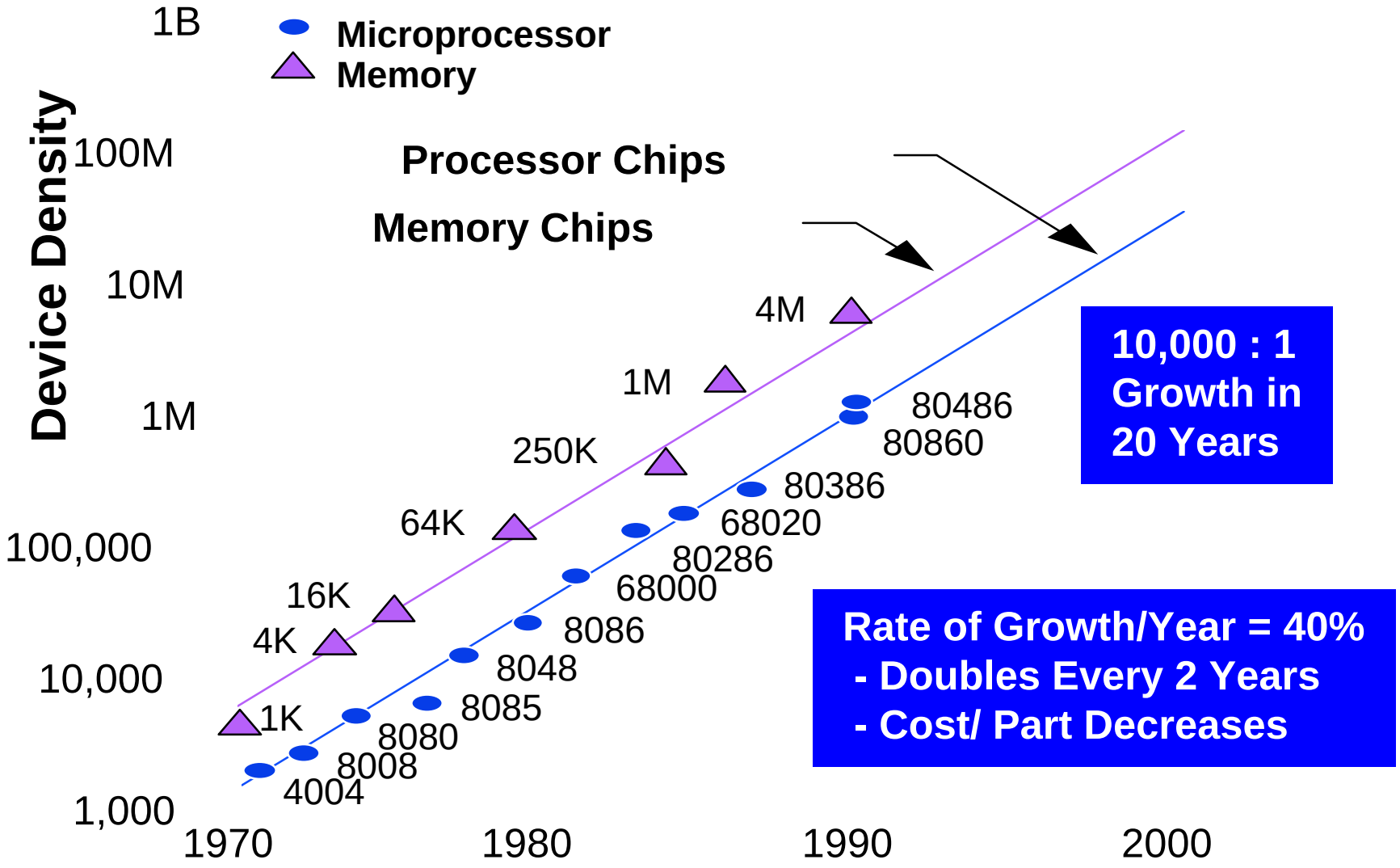
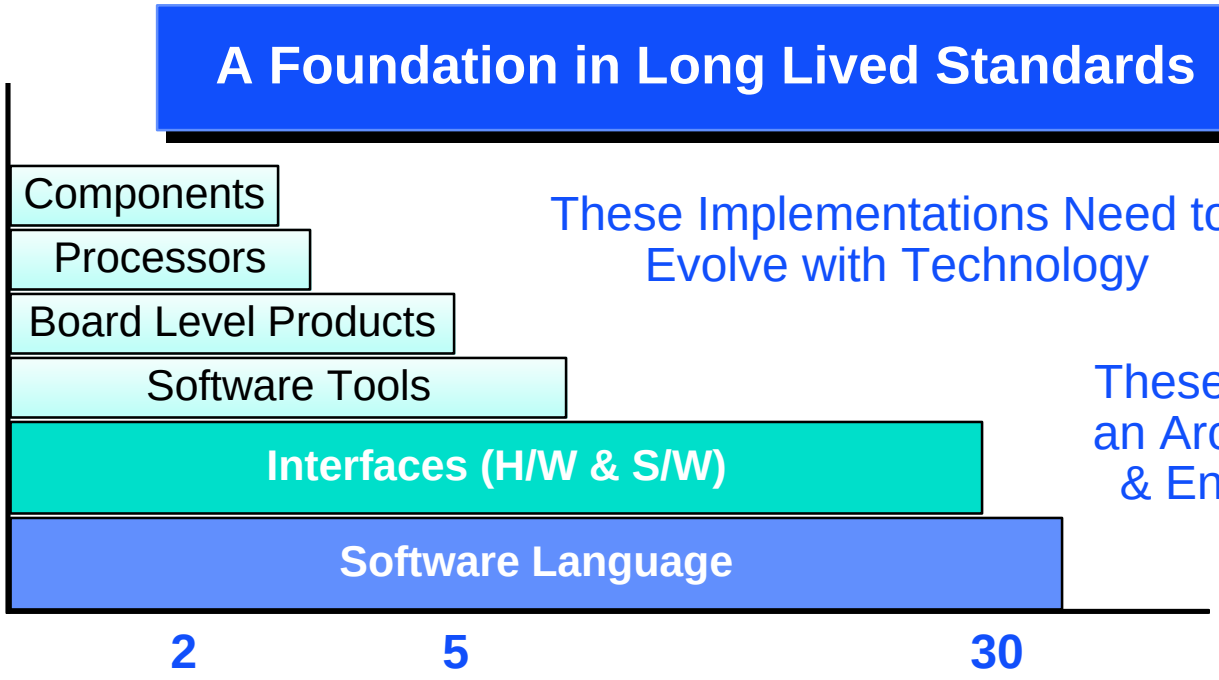
Technology Trends

Technology - The Growth Stock!



An Architectural Framework for Affordability



These Implementations Need to Evolve with Technology

These Standards Establish an Architecture Framework & Enable Interoperability

Source TI Presentation

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Open Systems Charter

Define Boeing's Enterprise Strategy for:

- Avionics Systems Affordability
- Open Systems Architectures

And Then…

TRANSITION

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Affordability Leadership

- 50% Reduction in Flyaway Costs
  - COTS Technology Insertion
  - Streamlined Affordability Processes
  - Acquisition Reform
  -
- 60% Reduction in Development Costs
  - Common Building Blocks
  - Reuse in Hardware & Software Architecture
  - Leveraged Developments Across Platforms
  -
- 60% Reduction in Operations & Support Costs
  - Two Level Maintenance of Hardware
  - Object Oriented Software Design
  - Improved Diagnostics & Open Architecture

Affordability

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Open System Leadership

- Enterprise Transition Opportunities
  - Program Roadmaps
  - Leveraged Developments
  - Rapid Prototyping
  -
- An Extensible Open System Architecture
  - Module Level Architecture
  - Object Oriented Software Architecture
  - Unified High Bandwidth Networks
  - Commercial Technology Transition
  -
- Advanced Tools & Processes
  - Advanced Algorithms
  - Automatic Code Generation
  - Commercial Software Tools

Open Systems Architecture

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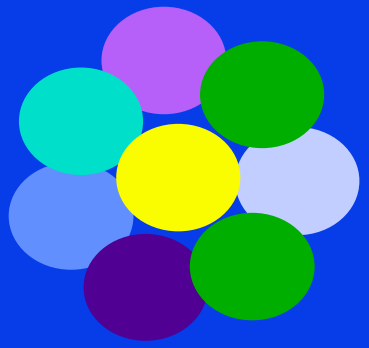
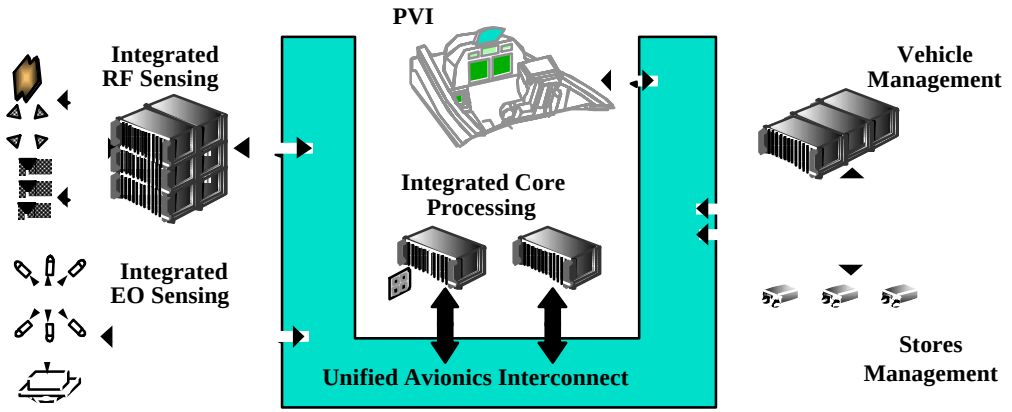
Program Execution

One Enterprise
Open Systems Avionics Architecture

BOLD STROKE
IPTs
Common Elements
Tools & Process





Leveraged Program Develop

F/A-18 | F-15 | AV-8B | JSF | C-17 | AH-64

Enterprise Funded Development Above & Beyond Program Requirements

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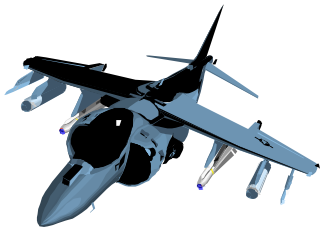
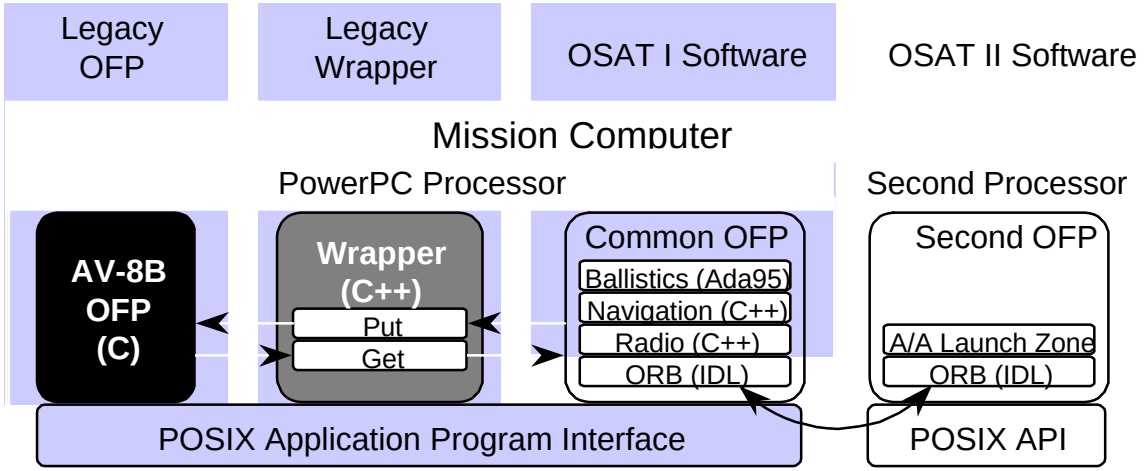
Risk Reduction Demos - Key to Transition Success

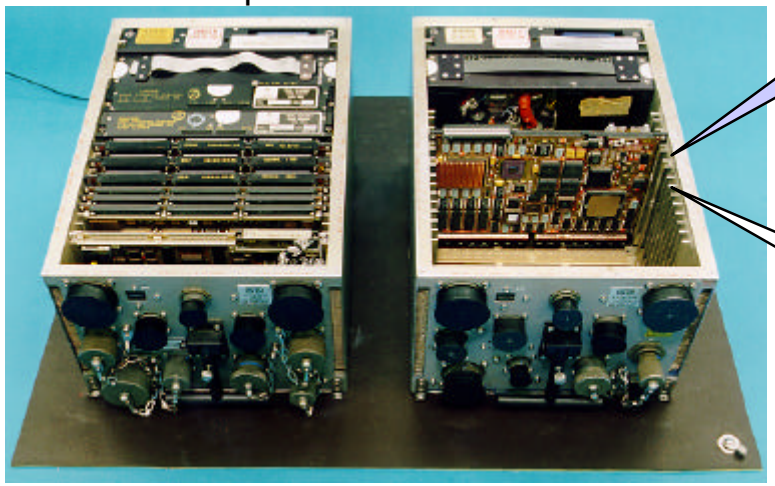


AV-8B



Original XN-6 Mission Computer

Modified XN-6 Or All-COTS MC



1 COTS Module With PowerPC Replaced 8 Original Modules

Add Second COTS Module For OSAT II

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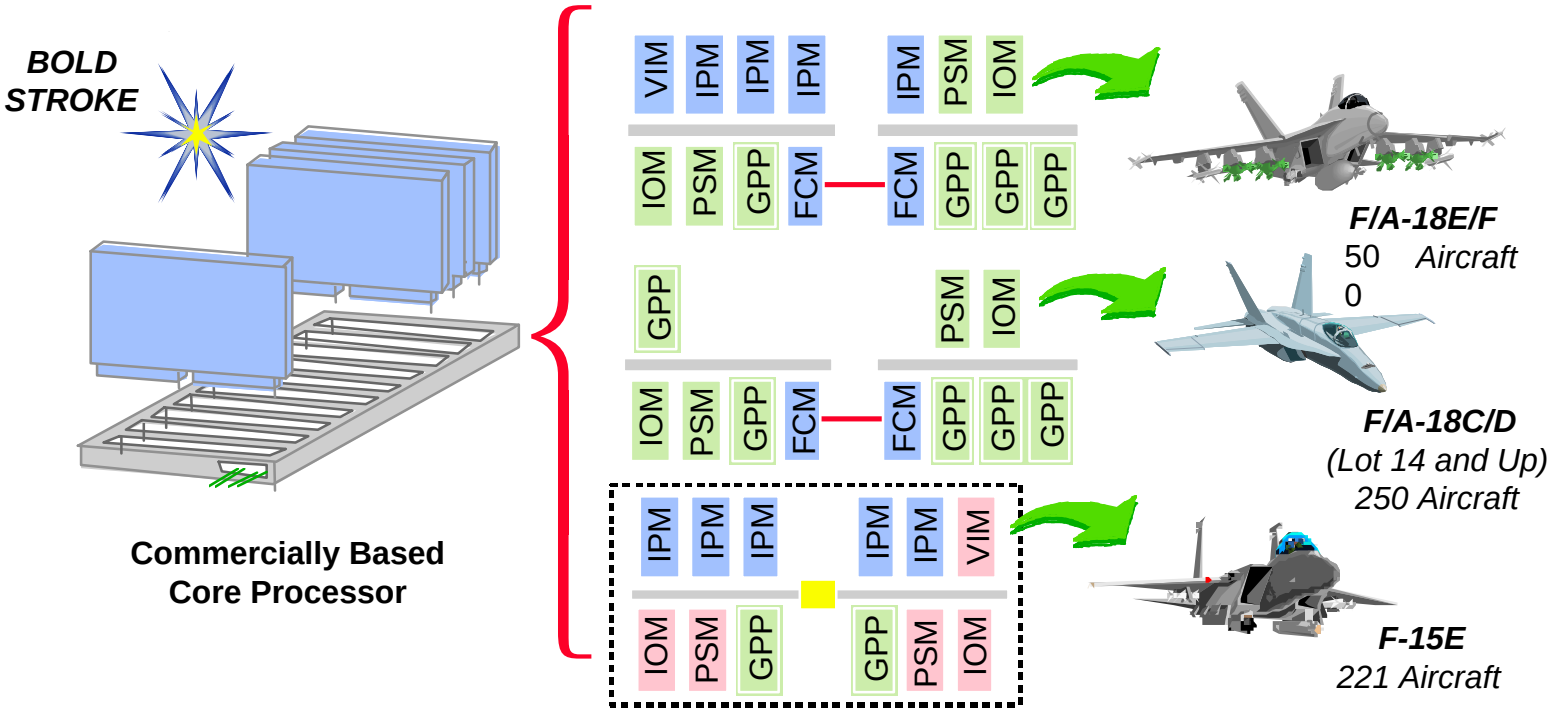
Reuse - A Key Open Systems Benefit



GPP = General Purpose Processor
IPM = Image Processor Module
FCM = Fibre Channel Module
IOM = Input / Output Module
VIM = Video Input Module
PSM = Power Supply Module

Legend
- Bold Stroke Module
- F-15 Module
- AV-8B OSCAR Module

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A Fundamental Change in the Way We Design, Build, and Field Avionics Systems

- **People**
  - True IPD Teams
  - Realignment of Responsibilities
  - Risk Sharing

- **Process**
  - Levels of F3I Mgmt
  - New Business Practices
  - System Level Solutions
  - System Support Plan
  - Test & Evaluation

- **Technology**
  - Real Time Performance
  - Packaging OTS
  - Environment
  - Technology Roll
  - Future Forecast
  - Military is Follower